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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/758,611	01/14/2004	David A. Stewart	ARC-14743-1	7529
25186	7590	03/20/2006	EXAMINER	
NASA AMES RESEARCH CENTER			IVEY, ELIZABETH D	
ATTN: PATENT COUNSEL			ART UNIT	PAPER NUMBER
MAIL STOP 202A-4			1775	
MOFFETT FIELD, CA 94035-1000			DATE MAILED: 03/20/2006	

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)
	10/758,611	STEWART ET AL.
	Examiner Elizabeth Ivey	Art Unit 1775
<i>-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --</i>		
<b>Period for Reply</b>		
<b>A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.</b>		
<ul style="list-style-type: none"> <li>- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.</li> <li>- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.</li> <li>- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.</li> <li>- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).</li> </ul>		
<b>Status</b>		
1) <input checked="" type="checkbox"/> Responsive to communication(s) filed on <u>23 December 2005</u> .		
2a) <input type="checkbox"/> This action is <b>FINAL</b> .                            2b) <input checked="" type="checkbox"/> This action is non-final.		
3) <input type="checkbox"/> Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under <i>Ex parte Quayle</i> , 1935 C.D. 11, 453 O.G. 213.		
<b>Disposition of Claims</b>		
4) <input checked="" type="checkbox"/> Claim(s) <u>1,3,4,6-12,14-45 and 47</u> is/are pending in the application.		
4a) Of the above claim(s) _____ is/are withdrawn from consideration.		
5) <input type="checkbox"/> Claim(s) _____ is/are allowed.		
6) <input checked="" type="checkbox"/> Claim(s) <u>1,3,4,6-12,14-45 and 47</u> is/are rejected.		
7) <input type="checkbox"/> Claim(s) _____ is/are objected to.		
8) <input type="checkbox"/> Claim(s) _____ are subject to restriction and/or election requirement.		
<b>Application Papers</b>		
9) <input type="checkbox"/> The specification is objected to by the Examiner.		
10) <input checked="" type="checkbox"/> The drawing(s) filed on <u>14 January 2004</u> is/are: a) <input checked="" type="checkbox"/> accepted or b) <input type="checkbox"/> objected to by the Examiner.		
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).		
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).		
11) <input type="checkbox"/> The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.		
<b>Priority under 35 U.S.C. § 119</b>		
12) <input type="checkbox"/> Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).		
a) <input type="checkbox"/> All    b) <input type="checkbox"/> Some * c) <input type="checkbox"/> None of:		
1. <input type="checkbox"/> Certified copies of the priority documents have been received.		
2. <input type="checkbox"/> Certified copies of the priority documents have been received in Application No. _____.		
3. <input type="checkbox"/> Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).		
* See the attached detailed Office action for a list of the certified copies not received.		
<b>Attachment(s)</b>		
1) <input type="checkbox"/> Notice of References Cited (PTO-892)		
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)		
3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____		
4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____		
5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)		
6) <input type="checkbox"/> Other: _____		

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

**The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.**

Claims 47 and 14-29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 47 and 14-29, claims 47, 15-19, 21-27 and 29 recite compositions as “approximately” a claimed percentage. It is unclear what level of variation in the percentage is acceptable, making claims 47 and 13-29 indefinite. What does applicant intend “approximately” to encompass?

Regarding claims 18-20, claim 18 recites that the coating “further comprises: a first sub-layer applied to the substrate...” however, claim 47 already indicates a first sublayer having an entirely different composition. Because the claims are in conflict with each other it is unclear what is being claimed in claims 18-20 and dependent claims do not further limit the independent claim.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1, 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. patent 4,039,997 to Huang et al.

Regarding claims 1, and 6 the examiner interprets applicant's claimed percentages to be weight percentages. Huang discloses a ceramic substrate with a coating of 25-90 wt% vitreous glass frit and 10-75 wt% particles of metal silicide. Huang discloses the vitreous frit is most preferably a borosilicate and discloses the metal silicide particles may include molybdenum disilicide and tantalum disilicide (column 2 lines 16-30). Although, Huang does not expressly

disclose the use of both molybdenum disilicide and tantalum disilicide in the respective percentages of 5-70 and 1-30 wt%, Huang does disclose the silicides to be interchangeable and used for the same purpose indicating they could be used interchangeably or together. Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to use both molybdenum disilicide and tantalum disilicide in the claimed ranges because the claimed ranges overlap with the silicide range of Huang and because overlapping ranges have been held to be a *prima facie* case of obviousness, *In re Malagari*, 182 USPQ 549.

Regarding claim 7, although, Huang does not expressly disclose a sub-layer of the coating comprising 20-60% molybdenum disilicide and 40-80% borosilicate glass, however because the claimed ranges overlap the claimed ranges and the ranges disclosed by Huang and because mere duplication of parts has no patentable significance unless a new and unexpected result is produced *In re Harza*, 274 F.2d 669, 124 USPQ 378, it would have been obvious to a person having ordinary skill in the art at the time of the invention to split the layer of Huang and use 2 layers of coating in place of the single layer to perform the identical function thereby meeting all of the limitations of the claim.

Claims 1, 3-4, 6-12, 30-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,079,082 to Leiser et al. in view of U.S. Patent Application 2001/0051218 A1 to Wittenauer et al.

Regarding claims 1 and 3-4, 6 and 10, Leiser discloses a composite insulating material comprising a porous body of fibrous low-density silica-based insulation material at least partially impregnated and therefore coated with a reactive glass frit, a fluxing agent and an emittance agent (column 2 lines 29-45). Leiser discloses a borosilicate glass matrix as the reactive glass frit, a silicon tetraboride flux or processing agent molybdenum disilicide as the emittance agent in the weight percentages of 77.5, 2.5 and 20 wt % respectively (column 2 line 60 – column 3 line 2 and column 3 lines 62-66). Leiser discloses that silicon hexaboride may be used in place of silicon tetraboride as the fluxing agent (column 4 lines 32-36). Leiser does not disclose a tantalum disilicide in the coating but Wittenauer (218) discloses a silicide coating, containing elements with melting points in excess of 1650°C, including molybdenum silicide or disilicide or tantalum silicide (page 2 paragraph [0026]) (with a composition of TaSi<sub>2</sub>) (also commonly called tantalum disilicide) on a ceramic oxide base structure (substrate) such as fibrous silica based materials (page 1 paragraph [0012]) and alumina silica blends (page 2 paragraph [0025]). Wittenauer (218) discloses the use of such silicides for the purpose of providing a substrate with oxidation protection, high emissivity, and resistance to mechanical damage (pages 1-2 paragraph [0015]). Therefore it would have been obvious to a person having ordinary skill in the art at the time of the invention to utilize either tantalum disilicide or molybdenum disilicide or both in optimal quantities of each as disclosed by Wittenauer (218) as the total weight percent of the emittance agent(s) in Leiser. Additionally, because the weight percent of glass and the emittance agent used in Leiser overlap the weight percents in the instant application, it would have been obvious to a person having ordinary skill in the art at the time of the invention to have selected

the overlapping portion of the ranges disclosed by the references because overlapping ranges have been held to be a *prima facie* case of obviousness, *In re Malagari*, 182 USPQ 549.

Regarding claims 7-9, Leiser discloses the coating impregnating the substrate (column 2 lines 40-45) but does not expressly disclose the depth of .010 inches to which it penetrates, however, a chemical composition and its properties are inseparable. *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 *MPEP 2112.01*. Because the prior art exemplifies the applicant's claimed composition and structure, the claimed physical property relating to the impregnation depth is inherently present in the prior art. Absent an objective evidentiary showing to the contrary, the addition of the claimed physical property to the claim language fails to provide patentable distinction over the prior art. Also, although Leiser and Wittenauer (218) do not disclose a coating and an under coating, since the claimed sub-layer coating contains overlapping compositional ranges with both Leiser and with the coating material, it would have been obvious to a person having ordinary skill in the art at the time of the invention to use two individual coating layers equivalent to and in place of a single layer because mere duplication of parts has no patentable significance unless a new and unexpected result is produced *In re Harza*, 274 F.2d 669, 124 USPQ 378.

Regarding claims 11-12, although neither Leiser nor Wittenauer (218) expressly disclose a particle size and mode of the coating materials, Leiser discloses ball milling the particles to produce smaller particle sizes to allow effective impregnation of coating into the substrate. Therefore, it would have been obvious to a person having ordinary skill in the art at the time of

the invention to adjust the particle size and mode for the intended application, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Regarding claims 30 and 36, Leiser discloses a composite insulating material comprising a porous body of fibrous low-density silica-based insulation material at least partially impregnated and therefore coated with a reactive glass frit, a fluxing agent and an emittance agent (column 2 lines 29-45). Leiser discloses a borosilicate glass matrix as the reactive glass frit, a silicon tetraboride flux or processing agent molybdenum disilicide as the emittance agent in the weight percentages of 77.5, 2.5 and 20wt% respectively (column 2 line 60 – column 3 line 2 and column 3 lines 62-66). Leiser discloses that silicon hexaboride may be used in place of silicon tetraboride as the fluxing agent (column 4 lines 32-36). Leiser does not specifically disclose an aluminosilicate or silicon/carbon substrate or tantalum disilicide in the coating but Wittenauer (218) discloses typical porous substrates such as silica with alumina fibers, alumina-silica and ceramic carbon fibers used for insulating material, as is Leiser's substrate and coating. Wittenauer (218) also discloses a silicide coating, containing elements with melting points in excess of 1650°C, including molybdenum silicide or disilicide or tantalum silicide (page 2 paragraph [0026]) (with a composition of TaSi<sub>2</sub>) (also commonly called tantalum disilicide) on a ceramic oxide base structure (substrate) such as fibrous silica based materials (page 1 paragraph [0012]) and alumina silica blends (page 2 paragraph [0025]). Wittenauer (218) discloses the use of such silicides for the purpose of providing an insulating substrate with oxidation protection,

high emissivity, and resistance to mechanical damage (pages 1-2 paragraph [0015]). Therefore it would have been obvious to a person having ordinary skill in the art at the time of the invention to utilize substrate of either aluminosilicate or ceramic/carbon composite as an insulating substrate and either tantalum disilicide or molybdenum disilicide or both in optimal quantities of each as disclosed by Wittenauer (218) as the total weight percent of the emittance agent(s) in Leiser. Additionally, because the weight percent of glass and the emittance agent used in Leiser overlap the weight percents in the instant application, it would have been obvious to a person having ordinary skill in the art at the time of the invention to have selected the overlapping portion of the ranges disclosed by the references because overlapping ranges have been held to be a *prima facie* case of obviousness, *In re Malagari*, 182 USPQ 549. Although Leiser and Wittenauer (218) do not disclose a coating and an under coating, since the claimed sub-layer coating contains overlapping compositional ranges with both Leiser and with the coating material, it would have been obvious to a person having ordinary skill in the art at the time of the invention to use two individual coating layers equivalent to and in place of a single layer because mere duplication of parts has no patentable significance unless a new and unexpected result is produced *In re Harza*, 274 F.2d 669, 124 USPQ 378.

Regarding claims 31-33, claims 31-33 are product by process claim wherein the patentability of the product does not depend on its method of production. “If the product in the product by process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process unless it can be shown that the product produced by the process is in some manner measurably distinct from the

product produced by another process.” *See MPEP 2113*. As such, the process limitations within claims 31-33 do not provide patentable distinction over the prior art.

Regarding claims 34-35, although neither Leiser nor Wittenauer (218) expressly disclose a particle size and mode of the coating materials, Leiser discloses ball milling the particles to produce smaller particle sizes to allow effective impregnation of coating into the substrate. Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to adjust the particle size and mode for the intended application, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Regarding claim 37, Leiser discloses a reactive glass frit, a flux or processing agent and an emittance agent in the weight percentages of 77.5, 2.5 and 20wt% respectively (column 2 line 60 – column 3 line 2 and column 3 lines 62-66). Although Leiser and Wittenauer (218) do not expressly disclose a range of 10-65wt% tantalum silicide, 5-30% molybdenum silicide and 20-45wt% borosilicate glass, However, it would have been obvious to a person having ordinary skill in the art at the time of the invention to adjust the weight percentages for the intended application, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Regarding claim 38, Leiser discloses a composite insulating material comprising a porous body of fibrous low-density silica-based insulation material at least partially impregnated and therefore coated with a reactive glass frit, a fluxing agent and an emittance agent (column 2 lines 29-45). Leiser discloses a borosilicate glass matrix as the reactive glass frit, a silicon tetraboride flux or processing agent and molybdenum disilicide as the emittance agent in the weight percentages of 77.5, 2.5 and 20 weight % respectively (column 2 line 60 – column 3 line 2 and column 3 lines 62-66). Leiser discloses that silicon hexaboride may be used in place of silicon tetraboride as the fluxing agent (column 4 lines 32-36). Leiser does not disclose a tantalum disilicide coating but Wittenauer (218) discloses a silicide coating, containing elements with melting points in excess of 1650°C, including molybdenum silicide or disilicide or tantalum silicide (page 2 paragraph [0026]) (with a composition of TaSi<sub>2</sub>) (also commonly called tantalum disilicide) on a ceramic oxide base structure (substrate) such as fibrous silica based materials (page 1 paragraph [0012]) and alumina silica blends (page 2 paragraph [0025]). Wittenauer (218) discloses the use of such silicides for the purpose of providing a substrate with oxidation protection, high emissivity, and resistance to mechanical damage (pages 1-2 paragraph [0015]). Therefore it would have been obvious to a person having ordinary skill in the art at the time of the invention to utilize either tantalum disilicide or molybdenum disilicide as disclosed by Wittenauer (218) as the emittance agent in Leiser. Additionally, although Leiser and Wittenauer (218) do not expressly disclose a range of 30-60wt% borosilicate glass, it would have been obvious to a person having ordinary skill in the art at the time of the invention to adjust the weight percentages for the intended application, since it has been held that discovering an

optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Regarding claims 39-40, Leiser discloses the coating impregnating the substrate (column 2 lines 40-45) but does not expressly disclose the depth of .010 inches to which it penetrates, however, since the materials and structure disclosed by Leiser and Wittenauer (218) are the same as the claimed article, the coating would inherently penetrate to the same depth as the claimed coating. A chemical composition and its properties are inseparable. *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 *MPEP 2112.01*. Because the prior art exemplifies the applicant's claimed composition and structure, the claimed physical property relating to the impregnation depth is inherently present in the prior art. Absent an objective evidentiary showing to the contrary, the addition of the claimed physical property to the claim language fails to provide patentable distinction over the prior art.

Regarding claims 41-43, claims 41-43 are product by process claim wherein the patentability of the product does not depend on its method of production. "If the product in the product by process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process unless it can be shown that the product produced by the process is in some manner measurably distinct from the product produced by another process." *See MPEP 2113*. As such, the process limitations within claims 41-43 do not provide patentable distinction over the prior art.

Regarding claims 44-45, although neither Leiser nor Wittenauer (218) expressly disclose a particle size and mode of the coating materials, Leiser discloses ball milling the particles to produce smaller particle sizes to allow effective impregnation of coating into the substrate. Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to adjust the particle size and mode for the intended application, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

*Response to Arguments*

Examiner acknowledges applicant's cancellation of claims 2, 5, 13 and 46, amendment of remaining claims and addition of new claim 47.

Applicant's arguments with respect to claims 1, 3-4, 6-12, 14-37, 38-45 and 47 have been considered but are moot in view of the new ground(s) of rejection.

Upon further review of the prior art and in view of the applicant's amendments, examiner has submitted revised rejections as indicated above.

***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patent 6,749,942 B1 to Wittenauer et al. discloses the use of tantalum disilicide and molybdenum disilicide as components in a thermal insulating system used in applications associated with atmospheric reentry, jet turbine combustion, and rocket propulsion.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elizabeth Ivey whose telephone number is (571) 272-8432. The examiner can normally be reached on 7:00- 4:30 M-Th and 7:00-3:30 alt. Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer McNeil can be reached on (571) 272-1540. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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PRIMARY EXAMINER  
3/13/06